



MATTER

Stuff.

Bellwork 9-14-16

-  A 45.6g sample of Nickel is poured into a graduated cylinder with 30.61 mL of water. If the water rises to 35.72mL, what is the density of the Nickel in g/cm³?
-  Objective: determine different ways to distinguish substances, and use the particulate model of matter to explain the properties of solids, liquids, and gases.


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- 🌐 **Demonstration**
 - 🌐 3 test tubes of clear liquids
 - 🌐 3 white powders.
- 🌐 **How can we distinguish between these substances, given they are actually different?**
 - 🌐 **Discuss with your lab group and come up with**
 - 🌐 3 ways to distinguish between the powders
 - 🌐 3 ways to distinguish between the liquids
 - 🌐 Try to justify your reasons!

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- 🌐 In groups, discuss the following
 - 🌐 In what situations would it be important to be able to distinguish between different substances?
 - 🌐 Try to come up with three. They can be real or hypothetical.
 - 🌐 What would be the consequence of failing to do so?

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 Potential cases in which determining substances is useful:

 Health monitoring

 Blood tests, Medical imaging dyes, drugs

 Crime investigation

 Forensic science

 Drug tests, explosives tests

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- 🌐 Now, we will shift our focus to trying to figure out how matter is made up.
- 🌐 To do this, we will use a model.
 - 🌐 Not a fashion model
 - 🌐 Something that represents a simplified description of a system

PARTICLES

- A simple and effective way to model matter:
 - The Particulate Model of Matter
- Assumptions:
 - Any macroscopic sample of a substance is composed of a LARGE number of small particles.
 - 1mL of water = 3.34×10^{22} particles.
 - Particles are in CONSTANT motion.

PARTICLES

- 🌐 Particle Simulator:

- 🌐 <https://phet.colorado.edu/en/simulation/legacy/states-of-matter-basics>

- 🌐 What did the dots represent?

- 🌐 Limitation:

- 🌐 Dots are HUGE compared to actual particles

SOLIDS

- Solid substances have the following properties
 - Particles tightly packed, vibrate slowly
 - Incompressible, fixed volume
 - Rigid
- Think of 3 examples of solids you have encountered outside of the classroom.




LIQUID

- 🌐 Liquids have the following properties:
 - 🌐 Particles further apart, able to move around each other, vibrate quickly
 - 🌐 Able to flow
 - 🌐 Have nearly fixed volume, somewhat compressible
 - 🌐 Assumes the shape of the container its in.
- 🌐 Think of 3 types of liquids you have encountered outside the classroom.


GAS

- 🌐 Gases have the following properties:
 - 🌐 Particles far apart, move quickly, able to flow
 - 🌐 Fill the volume of the container its in.
 - 🌐 Compressible
- 🌐 Think of 3 types of gases you have encountered outside the classroom.

Closure

-  Not being able to distinguish between different substances can have mild to disastrous consequences, so it is important we be able to do so.
-  Matter is made up of lots of tiny particles in constant motion.
-  Matter can exist in 3 states: solid, liquid, and gas.

Closure

-  Explain the similarities and differences between solids, liquids and gases.

Bellwork 9-15-16



An erlenmeyer flask weighs 40.0g. When filled with water, (density= 1g/cm^3) it weighs 100g. How much does the flask weigh when filled with hexane? (density= 0.6548g/cm^3).

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Objective: Use the Particulate Model of Matter to explain a phase change, and be able to create a Phase Diagram with all the essential parts.




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- 🌐 Yesterday, we learned about
 - 🌐 Why distinguishing between substances is important
 - 🌐 How to Model Matter (Particulate Model of Matter)
 - 🌐 Properties of solids, liquids, gases
- 🌐 Today, we're going to learn how Temperature and Pressure can affect the particles we looked at.

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- 🌐 Particle Simulator:
- 🌐 You guys are going to give me directions on what to do to the system.
 - 🌐 Change Temp by heating/cooling
 - 🌐 Change pressure by changing the Volume
- 🌐 Record all observations as we go between different temps and pressures
 - 🌐 Data table??

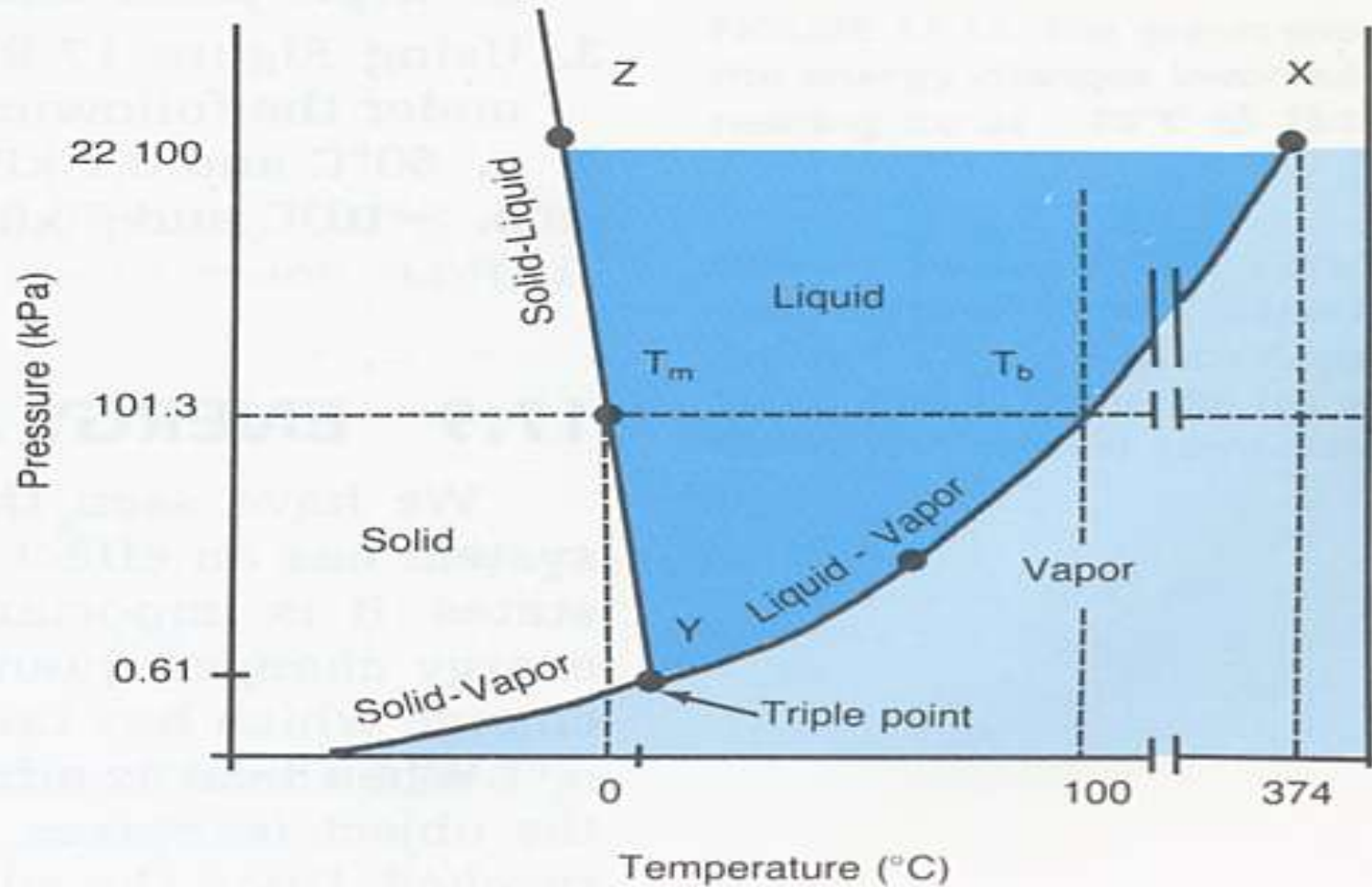
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-  We saw when we adjusted P/T, we could make different states of matter at unexpected temperatures.
-  What can we do with this data?
 -  (we did this in the density lab)

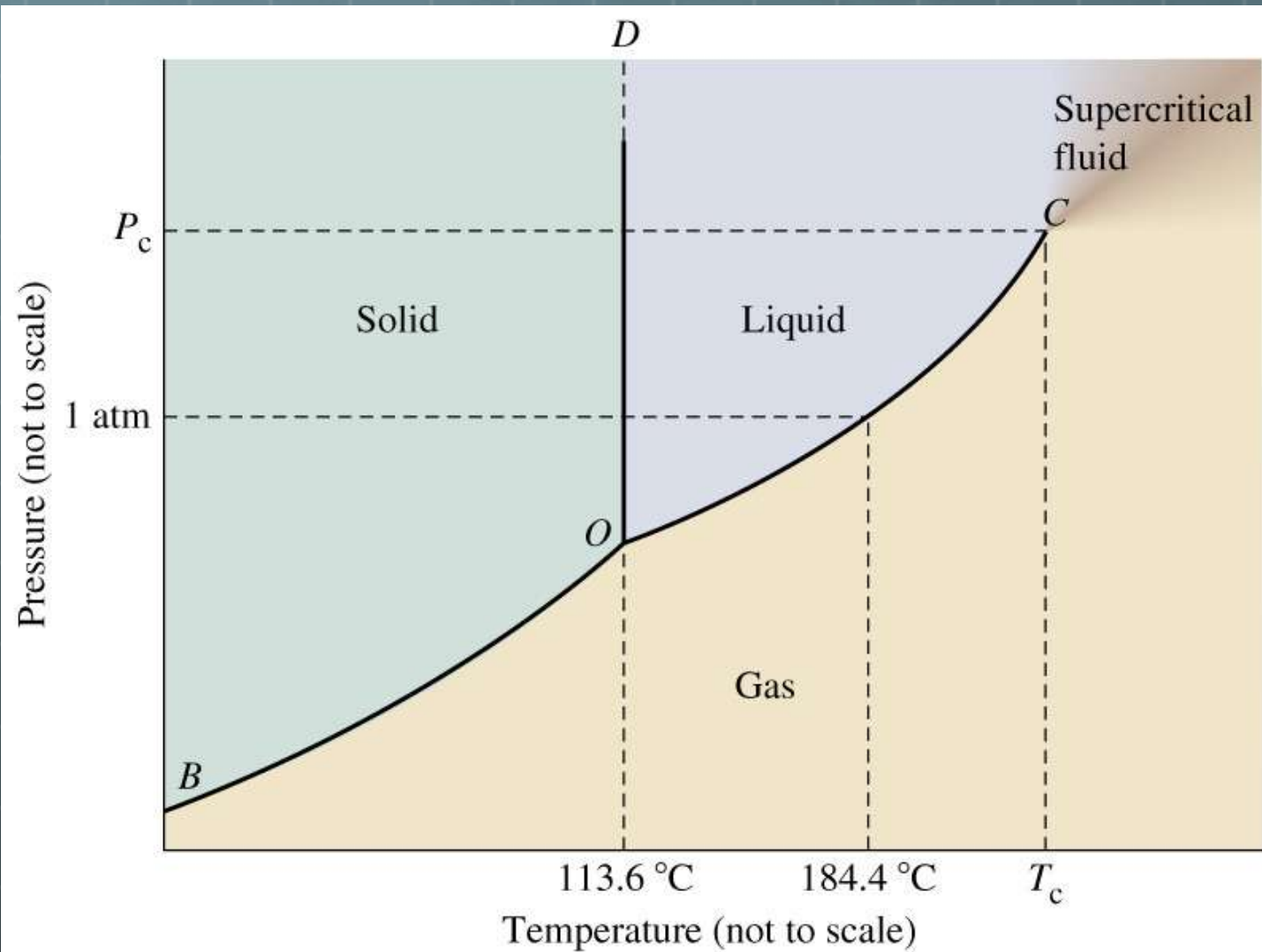
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- 🌐 Scientists have done A BUNCH of experiments like this, and are able to come up with complete data sets



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Closure

-  Explain what happens during a phase change w/ the Particulate Model of Matter
-  Draw a generic phase diagram w/ all the essential parts.